Satisfying A Critical Need

Millions of gallons of wastewater are treated by the Theresa Street Wastewater Treatment Facility every day to meet the City's obligations for protecting public health and the environment. Last year, the City and Nebraska Department of Environmental Quality successfully completed negotiations of permitted discharge pollutant limits, which set the stage for the foreseeable future of responsible wastewater treatment. A major change compared to previous discharge permits is the addition of ammonia as one of the pollutants requiring removal. Almost all facilities around the nation are encountering limits for ammonia. Lincoln is no exception.

With Lincoln's growth and progress, comes the need for increased infrastructure capacities, including that for wastewater treatment. This project creates the wastewater treatment infrastructure necessary to support the City growth. Figure 1 illustrates the stepwise timing of facility capacity improvements relative to the anticipated growth in wastewater flows. Based on these projections, the new facilities should satisfy ammonia treatment demands well into the 21st century.

Nature of the Construction Project

The existing Theresa Street Treatment Facility utilizes essentially three separate treatment plants, each operating in a parallel configuration. For this project, the existing "Central Train", consisting of old trickling filters having little ammonia treatment capability, will be replaced with a new Central Train that utilizes an advanced form of the Activated Sludge Treatment Process. This process, along with other treatment and pumping facilities, will be used to achieve required treatment. Figure 2 is an aerial photograph with the new treatment facilities identified. Figure 3 shows the new Central Train facilities in a simplified schematic diagram. A brief summary of each new process follows below. For ease of reference, the number of each item below correlates with those in Figures 2 and 3.

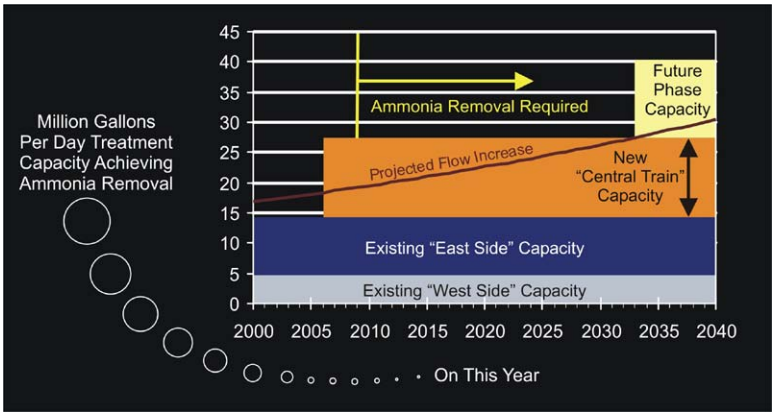

Figure 1: Plant Capacity

1. **New Primary Clarifier and Primary Sludge Pumping Station.** The new primary clarifier will operate in tandem with two other existing units to settle solids from the wastewater. State of the art spiral scraper solids withdrawal mechanisms will optimize settled solids concentration and removal rates. The settled solids from these clarifiers will be pumped to solids processing facilities for stabilization prior to land application as biosolids.
   Basic statistics & activities:
   - Demolish old grit basins and sludge pumping station.
   - Construct one new 100-foot diameter clarifier.
   - Construct new Sludge and Scum Pumping Station housing new pumps.

2. **Aeration Basins.** Aeration basins are the "biological reactors" of the treatment plant where dissolved contaminants are consumed by bacteria and converted into biological solids that can be removed from the wastewater. This process requires three basic conditions for proper operation: food in the form of wastewater, air for bacterial respiration, and an adequate population of bacteria to consume the amount of food (wastewater) that is present.
   Basic statistics & activities:
   - Demolish old trickling filter treatment train.
   - Construct 4.06 million gallon (MG) aeration basin with internal divider wall. Basin includes two anoxic basins (0.42 MG each) and two aerobic basins (1.61 MG each).
   - Construct aeration system utilizing fine-bubble diffusers fed by one blower and piping system inter-tied with the East Side aeration system for backup.
   - Construct new blower building housing new blower.

3. **Pre-Nitrification Basin.** This basin receives and aerates a thick concentration of recycled biological solids from the secondary clarification process (see Item 4 discussed below) and combines those solids with filtrate (from an existing solids dewatering process) that is high in ammonia. This advanced approach for filtrate ammonia removal reduces the overall project life-cycle cost and provides greater treatment control capability for plant operations staff compared to more conventional treatment techniques. The biological solids from this process are subsequently fed to the aeration basins for wastewater treatment as previously described in Item 2.

Basic statistics & activities:
- Construct 0.73 MG pre-nitrification basin.
- Construct aeration system utilizing fine-bubble diffusers fed by the same blower and piping system supplying the aeration basins (Item 2).

4. **Final Clarifiers and Central Final Sludge Pumping Station.** The final clarifiers receive the flow from the aeration basins (Item 2) and settle the solids to form a concentrated biosolids recycle stream, which is pumped back to the pre-nitrification basin (Item 3) for re-use. The clarifiers utilize state of the art influent flow dissipation and biosolids withdrawal mechanisms for optimum performance. Solids quantities exceeding treatment process needs are wasted by pumping to existing solids processing facilities for thickening, stabilization, dewatering and land application.
   Basic statistics & activities:
   - Construct two new 120-foot diameter clarifiers.
   - Construct new Central Final Sludge Pumping Station designed to handle two additional clarifiers in the future.

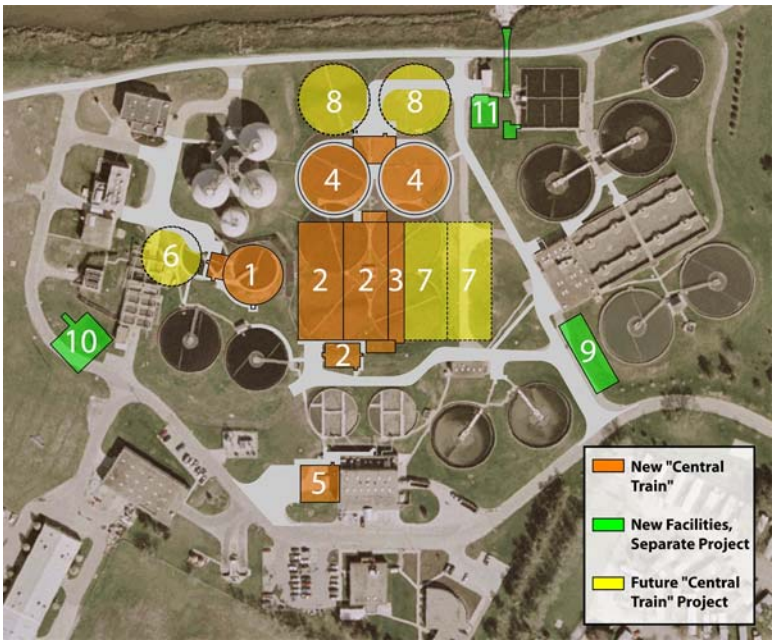

Figure 2: Theresa St. WWTF New Facilities

5. **Solids Dewatering Canopy.** This structure adjoins the existing solids dewatering facility and provides covered protection of loaded trucks during nighttime hours. This allows around-the-clock solids processing.
   Basic statistics & activities:
   Construct dewatering canopy structure.

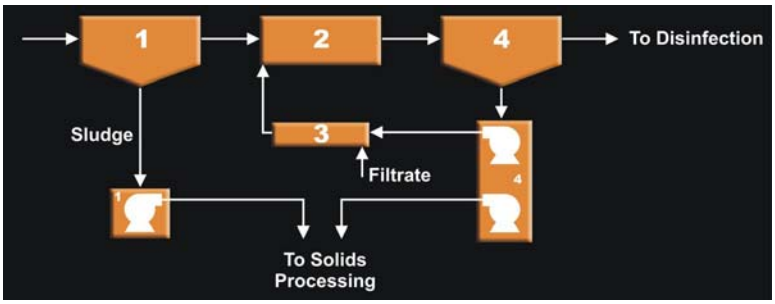

Figure 3: Simplified Process Schematic

6. **Future Primary Clarifier.** Same as Item 1, except constructed in a future phase.
7. **Future Aeration Basins.** Same as Item 2, except constructed in future phase.
8. **Future Secondary Clarifiers.** Same as Item 4, except constructed in future phase.
9. **Odor Control Facilities.** These facilities, currently under construction as a separate project, will reduce odor emissions from the treatment facility.
10. **Grit Removal Facilities.** These facilities, currently under construction as a separate project, and will remove the majority of grit from the wastewater prior to the primary and secondary treatment (Items 1 through 4 above).
11. **Ultraviolet (UV) Disinfection Facilities.** These facilities, under construction as a separate project, will disinfect plant effluent prior to its discharge into Salt Creek.

Cost

Cost control is critical to the long-term success and viability of any new facilities. Several viable alternatives were reviewed for this project in order to develop the most cost effective system. The total estimated project cost of the new treatment facilities (Items 1, 2, 3, 4 and 5) is $30 to 31 million.